

HEAT SINK HAVING AN ASSEMBLING DEVICE

BACKGROUND OF INVENTION

5 This invention relates to a heat sink for used in a computer, particularly to a heat sink having an assembling device.

10 The chips currently used by motherboards generate inevitable high temperatures during operation thereby affecting the life term thereof. The industry ^{has} ~~already~~ developed heat sinks disposed over the chips by means of certain structures ^{so} as to effectively eliminate and dissipate heat generated thereby ~~in view of such a~~ problem.

15 Accompanied with the implementation of heat sinks, the industry has developed various methods for fastening heat sinks onto the chips, such as by adhesive or by various clamping assemblies. These conventional methods are, however, ^{not well} ~~hardly~~ accepted by manufactures ^r. For example, while using adhesive for fastening heat sinks, the heat sinks frequently peel off during transportation due to failure of adhesive. ^{while} Using conventional clamping structure, the chips are easily damaged due to structural defects of clamping members resulting ^{from} ~~from~~ maintenance or disassembling processes.

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The present invention resolves such ^{shortcomings of} ~~bottlenecks~~ ~~confronted by~~ conventional fastening or resilient fastening structure.

BRIEF DESCRIPTION OF INVENTION

5 One objective of the invention is to provide a heat sink having an assembling device which steadfastly fastens a conventional heat sink onto a chip in a simple manner by means of simple mechanical concepts of resilience and flexibility.

10 According to an embodiment of the invention, a heat sink having an assembling device comprises a chassis having a heat dissipating surface, a plurality of fastening holes formed on the chassis, and fastening bolts as well as helical springs corresponding to the
15 fastening holes, wherein the fastening bolts each further comprise a ^{mushroom} ~~funus~~-shaped insertion end.

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According to another embodiment of the invention, a heat sink having an assembling device comprises a chassis having a heat dissipating surface and a
20 fastening seat for fastening the heat sink.

More particularly, the fastening seat is formed of a resiliently deformable and integrally formed hollow sheet and is provided with a pair of hooks each having a V-shaped barb for inserting the chassis into a hole,

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that is pre-formed on a motherboard and abuts a chip, and for resiliently pressing the heat sink against the chip.

Not only does the structure provided by the
5 embodiments as described in the invention allow the heat sinks to be easily assembled and efficiently disassembled, but also prevent the chips from damages.

The foregoing and other technical contents of the invention can be further realized with the drawings and
10 detailed explanations of the embodiments.

BRIEF DESCRIPTION OF DRAWING

Fig. 1 illustrates a perspective view of an embodiment of the invention ^{in use} ~~under state of use~~;

Fig. 2 is an exploded structural schematic view of
15 Fig. 1;

Fig. 3 is a schematic view illustrating the structure of Fig. 1 being inserted in and fastened to a motherboard;

Fig. 4 illustrates a perspective view of another embodiment of the invention ⁱⁿ ~~under state of~~ use;

Fig. 5 is an exploded structural schematic view of Fig. 1;

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Fig. 6 is an enlarged view of the hook structure of Fig. 5; and

Fig. 7 a schematic view illustrating the structure of Fig. 4 being inserted in and fastened to a motherboard.

LIST OF SYMBOLS

20	heat sink	30	fastening bolt
202	chassis	302	heat portion
204	chassis edge	304	bolt body
206	fastening end	306	insertion end
208	fastening hole	346	open hole
40	helical spring		
50	fastening seat	20'	heat sink
500	outer rim	202'	chassis
521	first section	204'	chassis edge
522	second section		
523	third section	C	chip
524	forth section	E	motherboard
560	hook hole	562	barb hole

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564 contact surface

R heat dissipating surface

566 apex

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

5 Figs. 1 and 2 illustrate an embodiment of a heat sink having an assembly device according to the invention under state of being used on a motherboard E, disclosed in which is a heat sink 20 for disposing over a chip C of the motherboard E. The heat sink 20
10 substantially comprises a chassis 202, fastening bolts 30, and helical springs 40.

As illustrated in Fig. 2, the chassis 202 is a flat sheet (generally rectangular) having a shape and dimension substantially identical to those of the chip C, on which chassis is formed with a plurality of heat
15 dissipating fins so as to form a heat dissipating surface R. The planar surface between the outer most edge of the chassis 202 and the heat dissipating surface R delineates a chassis edge 204. The chassis
20 202 of the heat sink 20 is provided with fastening ends 206 laterally extending from the chassis edge 204. Such fastening ends do not require any specific shape or quantity and are preferred to extend from diagonal corners of the chassis edge 204 in a pair. Each

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fastening end is formed with a fastening hole 208 having a first diameter thereon.

Each set of fastening holes 208 further adapt to fastening bolts 30 and helical springs 40 thereby forming structure for fastening the heat sink 20. As illustrated in Fig. 2, the fastening bolt 30 is substantially in a columnar configuration, the structure of which includes a head portion 302, a bolt body 30, and an insertion end 306. The head portion 302 located on top of the fastening bolt 30 has a large cross-sectional area as compared with that of the fastening bolt 30 body. The bolt body 304 is a substantially cylindrical body having a second diameter and locating beneath the head portion 302, one end of the which bolt body is connected to the head portion 302 and the other end extends downwardly and connects to the insertion end 306. The second diameter of the bolt body 302 is substantially smaller than or identical with the first diameter. The insertion end 306 is substantially similar to an ~~inversely frustum~~ ^{inverted frustocone} ~~funnel~~ and gradually converges and extends from the bolt body thereby forming a cylindrical frustum configuration. The cross-section of the junction where the insertion end 306 and the bolt body 304 joins is a circular one having a third diameter. The third diameter is larger than the first diameter of the

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fastening hole 208 and the second diameter of the bolt body 304. Furthermore, the fastening bolt 30 is preferably formed with a narrow opening 346 laterally penetrating the insertion end 306 and extending into a portion of the bolt body 304 thereby providing compressive resiliency in the radial direction.

As illustrated in Figs. 1 and 2, the helical spring 40 is telescopically provided over the bolt body 304 of the fastening bolt 30. The helical spring 40 has a forth diameter larger than the first diameter of the fastening hole 208. The cross-sectional area formed by the helical spring 40 is smaller than that of the head portion 302 of the fastening bolt 30. Therefore, one end of the helical spring 40 urges against the head portion 302 and the other end against the peripheral planar surface of the fastening bolt 208 after assembly of the helical spring 40.

As illustrated in Fig. 2, in operation the motherboard E is formed with penetrated holes H thereon at locations corresponding to the fastening holes 208. The holes H are so dimensioned as to be substantially the same as the fastening holes 208 for compressively clamping the insertion ends 306 of the fastening bolts 30 therein. As illustrated in Figs. 2 and 3, in operation the chassis 202 is initially placed over a

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surface of the chip C, the fastening bolts 30 then in term insert through the helical springs 40 and fastening holes 208, and finally insert and clamp into the holes H formed on the motherboard E.

5 When the insertion end 306 of the fastening bolt 30 inserts into the hole H, the narrow opening 346 formed on the insertion end 306 of the fastening bolt 30 subjects the insertion end 306 to respond to the lateral pressure imparted to the insertion end 306 by
10 the motherboard E thereby facilitating insertion of the fastening bolt into the hole H. Finally, collaboration between resiliency of the helical spring 40 and the shape of fastening bolt 30, the heat sink 20 can resiliently press against the chip C thereby enhancing
15 heat transfer effect and adapting to chips of various thickness.

 Figs. 4 and 5 illustrate another embodiment according to the invention under state of being used on a motherboard E. As illustrated in the figures, a heat
20 sink 20' is disposed over a chip C on the motherboard E. The heat sink 20' substantially comprises a chassis 202' and a fastening seat 50.

 As illustrated in Fig. 5, the chassis 202' is a flat sheet having a shape and dimension substantially
25 identical to those of the chip C, on which chassis is

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formed with a plurality of heat dissipating fins so as to form a heat dissipating surface R. The planar surface between the outer most edge of the chassis 202' and the heat dissipating surface R delineates a chassis edge 204'.

The fastening seat 50 is formed by a resiliently curvable and integrally formed hollow sheet, and is preferably formed of a metal sheet. It is shown in the figures that the fastening seat 50 mainly comprises an outer rim 500 and hook portions 560.

As illustrated in the figures, the shape and dimension of the outer rim 500 are substantially the same as those of the chassis edge 204'. The outer rim 500 is also telescopically provided over the chassis edge 204'. Though the outer rim 500 is an integrally formed sheet, it is further distinguished into a first section 521, a second section 522, a third section 523 and a forth section 524 which are sequentially connected, for the ease of explanation. More particularly, the shape and dimension of the first and third sections 521, 523 are completely identical to and disposed symmetrically about each other; the second and forth sections 522, 523 are also completely identical to and disposed symmetrically about each other, wherein the first and third sections 521, 523 extend

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horizontally and the second and forth sections 522, 524 incline upwardly and outwardly.

There are two hooks 560, each of which extends outwardly and rearwardly from center of the second and forth sections 522, 524, respectively, to form a downwardly extended L-shaped configuration.

Particularly, each hook 560 downwardly extends and connects to a V-shaped barb 562. The apex 566 of the V-shaped barb 562 extends toward the chip C, and the lower portion of each V-shaped barb 552 defines a contact surface 564. The shape of the barb 561 is preferably as shown in Fig. 6.

A pair of holes H' can be pre-formed on the motherboard E. The locations of the holes H' subject the contact surface 564 of the barbs 562 of the fastening seat 50 to contact with sides of the holes H' abutting the chip C'.

Fig. 7 is a structural illustration of Fig. 4 illustrating the state of the heat sink 20' being steadfastly fastened onto the motherboard E by means of the fastening seat 50. In view of Figs. 4 and 7, after the barbs 562 of the fastening seat 50 are inserted into the holes H', the second and forth sections 522, 524 originally inclined upwardly and outwardly are each

pressed against the chassis edge 204' of the heat sink 20' such that the heat sink 20' can be resiliently and tightly pressed against the chip C thereby enhancing heat transfer effect and adapting to chips of various thickness.

Foregoing embodiments of the invention ingeniously implement simple mechanical concepts of resilience and flexibility to a heat sink having an assembling device so as to achieve their intended functions. It should be appreciated that only trivial pressure is required to be imparted on the foregoing structure so as to subject the overall heat dissipating device being assembled to a designated location during assembly and that only trivial force is required to be imparted on the fastening bolts or fastening seat underneath the motherboard so as to release the foregoing structure during disassembly, thereby allowing the heat sinks being efficiently assembled and disassembled and steadfastly fastened without damaging the chip.

The invention can also be realized by other specific embodiments without departing from the concepts and essential features thereof. Therefore, all embodiments expounded in the foregoing descriptions are illustrative but not limited in any domain. All modifications complying with the concepts and scope of

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the claims or other equivalence are contemplated by the realm of the invention.

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